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**General specification for permanent magnet brushless motor  
system**

永磁无刷电动机系统通用技术条件

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## Foreword

This standard is the base standard for permanent magnet brushless motor systems. It specifies the terms and definitions, the operating conditions, the basic requirements, the test methods and the acceptance criteria for the permanent magnet brushless motor system and for the permanent magnet brushless motors and permanent magnet brushless motor drivers that make up the system. It was compiled with reference to relevant Chinese and foreign standards and draws on the research, development and production experience gained with permanent magnet brushless motor systems.

This standard is consistent with the other micromotor standards and with the other related standards.

This standard was proposed by the China Electrical Equipment Industry Association.

This standard is under the jurisdiction of the National Technical Committee for the Standardization of Micromotors.

It was issued on 22 January 2008 by the General Administration of Quality Supervision,

Inspection and Quarantine together with the Standardization Administration of the People's Republic of China, and has been in force since 1 September 2008. The /T in the designation marks it as a recommended national standard.

## 1 Scope

China's national base standard for the permanent magnet brushless motor system - the motor, its sensing and its driver treated as one product rather than three. A brushless machine has no commutator, so it cannot turn at all unless an electronic driver energises the right winding at the right instant relative to where the rotor happens to be; specifying the motor on its own would describe nothing a buyer can measure, because efficiency, torque ripple, speed range, starting behaviour and noise all belong to the combination. This is why the document opens with more than thirty definitions before it states a single requirement: terms such as peak torque, maximum continuous torque, the continuous duty zone and the intermittent duty zone only mean something once the boundary between them has been drawn, and that boundary is set by the heating of the windings and by the limits of the driver, not by the motor alone. The standard specifies the terms and definitions, the operating conditions, the frame numbers, the basic requirements and test methods, the special tests, the nameplate information, the safety requirements, the inspection rules and the packaging and storage for the system and for the permanent magnet brushless motors and drivers that make it up. It was drawn up with reference to related Chinese and foreign standards and to the research, development and production experience accumulated on these machines, and it is written to be consistent with the other Chinese micromotor standards. Manufacturers of servo drives, of appliance and tool motors and of the traction and pump drives that have moved to brushless construction use it as the common vocabulary in which a specification can be written and checked.

This standard specifies the terms and definitions, the operating conditions, the basic requirements, the test methods and the acceptance criteria for permanent magnet brushless motor systems and for the permanent magnet brushless motors and permanent magnet brushless motor drivers that constitute the system.

This standard applies to permanent magnet brushless motor systems (hereinafter referred to as the system) and to the permanent magnet brushless motors (hereinafter referred to as the motor) and the permanent magnet brushless motor drivers (hereinafter referred to as the driver) that make up the system.

## 2 Normative references

The provisions of the following documents become provisions of this standard through reference in this standard. For dated references, subsequent amendments (excluding corrections) or revisions do not apply to this standard; however, parties to agreements based on this standard are encouraged to investigate whether the most recent editions of

these documents may be used. For undated references, the latest edition applies.

GB/T 191 Packaging - Pictorial marking for handling of goods (GB/T 191-2000, eqv ISO 780:1997)

GB 755-2000 Rotating electrical machines - Rating and performance (IEC 60034-1:1996, IDT)

GB/T 2423.1 Environmental testing for electric and electronic products - Part 2: Test methods - Test A: Cold (GB/T 2423.1-2001, IEC 60068-2-1:1990, IDT)

GB/T 2423.2 Environmental testing for electric and electronic products - Part 2: Test methods - Test B: Dry heat (GB/T 2423.2-2001, IEC 60068-2-2:1974, IDT)

GB/T 2423.3 Basic environmental testing procedures for electric and electronic products - Test Ca: Damp heat, steady state (GB/T 2423.3-2006, eqv IEC 60068-2-78:2001)

GB/T 2423.5 Environmental testing for electric and electronic products - Part 2: Test methods - Test Ea and guidance: Shock (GB/T 2423.5-1995, idt IEC 60068-2-27:1987)

GB/T 2423.10 Environmental testing for electric and electronic products - Part 2: Test methods - Test Fc and guidance: Vibration (sinusoidal) (GB/T 2423.10-1995, idt IEC 60068-2-6:1982)

GB/T 2828.1-2003 Sampling procedures for inspection by attributes - Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection (ISO 2859-1:1999, IDT)

GB/T 2900.26 Electrotechnical terminology - Control machines

GB/T 2900.56 Electrotechnical terminology - Automatic control

GB/T 4772.1 Dimensions and output series for rotating electrical machines - Part 1: Frame numbers 56 to 400 and flange numbers 55 to 1080 (GB/T 4772.1-1999, idt IEC 72-1:1991)

GB 4824-2004 Industrial, scientific and medical (ISM) radio-frequency equipment - Electromagnetic disturbance characteristics - Limits and methods of measurement

GB/T 7345-1994 Basic technical requirements for control micromotors

GB/T 7346 Basic types of external structure for control motors

GB/T 10069.1 Measurement of noise of rotating electrical machines and noise limits - Engineering method of measurement

GB/T 17626.2-2006 Electromagnetic compatibility - Testing and measurement techniques - Electrostatic discharge immunity test (IEC 61000-4-2:2001, IDT)

GB/T 17626.3-2006 Electromagnetic compatibility - Testing and measurement techniques - Radiated radio-frequency electromagnetic field immunity test (IEC 61000-4-3:2002, IDT)